again for the most part, so that the appearance of the district was intermediate between that which it recently presented and that under which it was seen in 1886. Of the channels M. Perrotin has noticed four, three of which are double, which, starting from the "seas" of the southern hemisphere near the equator, and following a nearly meridional course, extend right up to the north polar ice cap, being traceable across the "seas" which immediately surround the latter.

Although Schiaparelli, as it will have been seen, connects the changes in the channels with the seasons of Mars, and although Perrotin and Thollon show their relation to the seas in their vicinity, other explanations of the phenomena have been suggested. Among these we must first refer to the view of Fizeau,[1] that we were in presence of the results of glaciation on a tremendous scale, the parallel ridges being likened to crevasses or rectilinear fissures! It was imagined by him that relatively longer seasons and a lower temperature were capable of producing crevasses some thousands of miles long and hundreds broad.

But this was not the only physiographic explanation offered. Mayeul Lamey, a Benedictine monk, ascribed the channels to volcanic action; to him they were the remains of enormous crater walls, and he states that they are best seen when Mars reaches its most gibbous form and the angle of the incident light is greatest.

"Le plus souvent les astronomes se bornent à observer Mars vers l'époque de son opposition, c'est-à-dire de sa plus grande proximité de la terre; c'est, pensent-ils, le meilleur moyen de voir bien et de près les 'mers' de Mars. Si ces taches étaient des mers la raisonnement serait excellent, mais il n'en est pas ainsi. M. Schiaparelli a déjà fait la remarque que les canaux découverts par lui ont été observés non au voisinage de l'opposition mais un mois, deux mois après. Et pourtant la planète est alors bien eloignée déjà de nous. Pour moi, je constate également le même fait; je découvre tous les soirs un nombre de cirques de plus en plus considérable. La raison en est bien simple, du moment que les taches sont des ombres, ou du moins des parties réfléchissant moins lu lumière. A l'époque de l'opposition, en effet, les rayons solaires tombent à peu près perpendiculairement sur la surface de la planète; Mars ne possède alors pas de phase, tandis qu'un mois avant ou après, la phase est très accentuée et les ombres deviennent possibles avec les élévations du sol."[2]

Another attempted explanation was that the channels were doubled in consequence of some play of diffraction. But enough has been said on this head; let us rather turn to the first fruits of last month's work.

At the Lick Observatory the channels were seen, and one of them was considered by three observers to be doubled.

From Peru we learn that Prof. Pickering saw many of the channels observed by Schiaparelli, but all were found to be single. The telegram adds, "not double, as stated by him"; but here is an error. We are near the southern solstice, as in 1877, and they were *not* seen double at that epoch. But even this is comparatively uninteresting after the revelations as to the effects of the melting snows.

Prof. Pickering discovered two mountain ranges in Mars to the north of the green patch near the planet's south pole. Between these mountain ranges the melted snow has collected before flowing northward. In the equatorial mountain regions snow fell, covering two of the summits, on August 5. On August 7 the snow had melted. "I have seen eleven lakes," the professor writes, "varying in size. These lakes branched out in dark lines connecting them with two large dark areas like seas, but not blue. There has been much local disturbance in the clouds round the planet since the snow melted, as is evident from the dense clouds which were concentrated within one area. These clouds were not white, but yellowish in colour, and partly transparent. They now seem to be breaking up, but are still hanging densely on the south side of the mountain range. The northern green spot has been photographed."

Surely we have here the connection between the work of 1862 and 1877. The channels are true water channels; at one time at low channel we may have an unimportant stream like the low Nile; at another an ancient river-bed, as it were, is filled to the utmost limit by the inundation. One requires to have seen an Indian river, or better still, the Nile valley to realize what an inundation may mean, and especially under the conditions which have now been established to exist on Mars. But we may go further. A comparison of Schiaparelli's sketch of 1882 with his map of 1879, helps us considerably, and shows that we must take the effect of clouds over warm water into consideration. Two among the most undoubted and continuous water-surfaces which I observed in 1862, which he has named Mare Cimmerium and Sabæus Sinus, were doubled also in 1882, and in my mind there is no doubt whatever that this doubling, at all events, is due to cloud banks lying, or rather travelling longitudinally, along the centre of the water-surface, precisely as the most magnificent cumuli which I have seen on this planet, follow the Equatorial current, entering the Carribean Sea by Tobago. Obviously, by their lightness of shade, the channels are shallow, and they are only noticed in or near the tropics, so that the water must be highly heated before it empties itself into any of the southern seas.

Certainly it must be acknowledged that while the revelations show a remarkable similarity to our own atmosphere, so far as chemical structure and temperature are concerned, for the *onus probandi* lies with those who deny that we are dealing with the various forms of water, it would appear that the extremes of heat and cold are more generally operative in Mars than with us. The problem thus presented to us should prove interesting to the geologist. Was there any period in the earth's past history, or can there be in the future, which more resembles the present Martian conditions? Had we these enormous inundations, chiefly caused by polar snows melting? If not, were we sheltered from them by our more circular orbit and shorter year? Is Mars red because it is muddy? If so, what mud could give it the tinge we know?

J. Norman Lockyer.

NOTES.

For some days much anxiety was felt as to the condition of Sir Richard Owen. We are glad to say that his health has greatly improved, and that he is now able to take more nourishment.

The four hundredth anniversary of the discovery of America is being celebrated this week with great splendour at Genoa. The King and Queen of Italy are taking part in the celebration, and the maritime Powers are represented by a fine assemblage of warships.

A Botanical Congress, which is attended by some of the most eminent botanists of Berlin, Paris, Jena, and St. Petersburg, was opened at the University of Genoa on September 5.

An interesting ceremony took place at the University of Genoa on Tuesday, when the Hanbury Institute was formally handed over to that body. The correspondent of the *Times* at Genoa says that Mr. Thomas Hanbury, an English gentleman, whose house at La Martola, near Ventimiglia, is well known to visitors to the Riviera, had already won the gratitude of Italians by his generous deeds in that neighbourhood, and a year or two ago he offered £4000 to found an institution in Genoa for the encouragement of the study of botany. Senator Secondi, president of the University, gave expression to a sincere feeling of gratitude towards Mr. Hanbury, and accepted the gift of the institute in the name of the University. A large number of distinguished botanists, who are attending the congress now being held there, were present at the ceremony.

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[1] *Comptes Rendus*, June, 1888.

[2] "Note sur la Découverte du Système Géologique Éruptif de la planète Mars." Par Fr. Mayeul Lamay, O.S.B. Autun. (Dejussien, 1884.)

THE meeting of the German Mathematicians' Union in Nürnberg, and the Mathematical Exhibition, are postponed on account of the cholera.

THE German Chemical Society have resolved to found an Institute in remembrance of the late Prof. von Hofmann. Large funds will naturally be required, and all pupils and those who honour Hofmann's life and work are earnestly requested, in a recently-issued circular, to send contributions. Even those who had no personal knowledge of the illustrious *savant*, but have been inspired to work by his example, will no doubt be willing to take part in the scheme. The proposed Institute will not merely serve chemical purposes, but will be a place of general scientific research.

THE International Congress of Physiologists has held its second triennial session at Liège with Prof. Holmgren (Upsala) as President, in the Physiological Institute under Prof. Léon Fredericq. The Congress terminated on Thursday, September 1, after a banquet at which the Burgomaster of the city was present. More than one hundred physiologists attended the Congress.

THE thirteenth Congress of the Sanitary Institute will be held at Portsmouth from September 12 to 17. Sir Charles Cameron will preside. The Congress will be divided into three sections—one dealing with sanitary science and preventive medicine, another with engineering and architecture, and a third with chemistry, meteorology, and geology. Conferences will be held by naval and military hygienists, by medical officers of health, by municipal and county engineers and surveyors, by sanitary inspectors, and by ladies on domestic hygiene. A health exhibition, including sanitary apparatus and appliances, in connection with the Congress, will be held in the Drill Hall from September 12 to October 8.

A PHOTOGRAPH of the late Admiral Mouchez—one of the best photographs of him we have seen—appears in the July number of the *Bulletin Astronomique*, which journal owes its existence to his indefatigable exertions. There is also a brief account of his life written by M. Tisserand.

THE sixth session of the Vacation Courses, known as the Edinburgh Summer Meeting, has just come to a close after a very successful month's work. The importance of this meeting increases year by year with the steadily increasing number of students, and with the more complete organization of the plan of study. This has again been arranged so as to assist in the training of school teachers and University Extension lecturers for the new duties which are beginning to devolve upon them in connection with the requirements of County Councils for technical education. Hence the principle of "Regional Study" has again been kept prominently in view, Edinburgh and its districts being taken as a typical area, and affording a starting point and vivid concrete illustrations for the courses on sociology and anthropology (Profs. Geddes and Haddon) on the one hand, and on the other for those on biology (with special courses of zoology and botany) and physiology by Mr. J. Arthur Thomson, Prof. Haycraft, and others. The course on literature by Prof. Moulton which was very largely attended, followed to a large extent the same general lines as the more purely scientific courses. The work in the historical seminary and the studio was continued, and a series of technical education lectures was given in the evenings by Principal Dyer, Profs. Mavor, Geddes, and Prince, Mr. C. Williams, and others. Many nationalities were represented among both students and teachers. Besides many British Association and other visitors, Profs. Haeckel (Jena), Delage (Paris), attended the meeting. Special lectures were delivered by Profs. Devine and Rolf (Philadelphia), Profs. Manouvrier and Demoulins (Paris), Principal Dyer, Profs. Mavor, Prince, Lloyd Morgan, Sollas, Messrs. R. Aitken, W. Renton, R. Irvine, and others. A series of interpretative recitals by Prof. Moulton, and four concerts illustrating the history of music were also given.

FIFTY scholarships, named the Townshend Scholarships, from funds bequeathed by the late Rev. Chauncey Hare Townshend, for working-class boys or girls between 14 and 21, to be held for one year, have just been established in connection with the Westminster Technical Institute, 40 being free and 10 competitive. The subjects taught in the Institute, which was founded by the Baroness Burdett-Coutts, are rudimentary, commercial, and technical, and include drawing, technical, mechanical, and artistic; geometry, practical, plane, and solid; working in wood, lead, metal-plate, &c.; cookery, dressmaking, shorthand, foreign languages, &c.

A REMARKABLE grotto, which is exciting the interest of French geologists and mining engineers, was recently revealed by an explosion during the progress of the ordinary work in a quarry at Taverny. The Paris correspondent of the *Times* says there is a subterranean gallery, with walls polished as if by water; and that it is some 1500 feet in length, and ends in a great chamber about 40 feet in diameter and 6 feet in height. Scientific men have hazarded various conjectures as to the source of the watercourse by which this cavity seems to have been formed.

MR. HERMANN KRONE gives, in No. 7 of Wiedemann's "Annalen," an account of some further experiments connected with the photography of spectra in their natural colours by Lippmann's method. He finds that the correct rendering of the various colours depends upon a high degree of accuracy in the proportions of the finely divided silver haloid and the colour sensitiser, as also upon the temperature of drying, the exposure, and the development. If the essential conditions are not fulfilled, it may happen that yellow appears in the place of red, or that green exhibits a direct transition into violet, the blue being unrepresented. The result also depends upon the amount of water contained in the film, as influencing its thickness, and in the case of the solar spectrum upon the altitude of the sun. With a very long exposure the infra-red appears as a dark purple, and the ultra-violet as a yellowish-pink lavender colour. Mr. Krone has also succeeded in producing coloured photographs without Lippmann's mercury mirror. He simply covers the film with black velvet, exposing, as Lippmann did, through the glass. In this case, the reflection from the inner surfaces of the glass takes the place of that from the mercury. The exposure has to be considerably prolonged, and the colours towards the red end are less pure; but the blue, violet, and ultra-violet are quite as brilliant and well defined as in the mercury process.

DURING the past week the weather has assumed a decidedly autumnal character, the maximum temperatures being below 65° in many parts of the United Kingdom, and below 55° in some of the northern parts. For the first few days depressions from the Atlantic caused unsettled and showery weather, with strong winds or gales. On Sunday, however, an area of high pressure spread over England, and under its influence the sky rapidly cleared, and the wind became northerly, while at Greenwich Observatory a temperature of 4° below freezing point was registered on the grass; but the more northern and western parts of the Kingdom were still disturbed by depressions from the westward. These have subsequently spread over the greater part of the country, and winds have again become south-westerly generally. The facts shown by the *Weekly Weather Report* for the period ending the 3rd instant, are interesting:—The rainfall exceeded the mean in all districts, the greatest excess being in the west of Scotland and the north-west of England, and the fall was more than twice as much as the normal amount over the Kingdom generally. Temperature was below the mean in all districts, except the south of England and the Channel Islands, while in Scotland the lowest shade minima were between 32° and 35°.

Prof. Mohoroviéié, of Agram, writes to the *Meteorologische Zeitschrift* for August a preliminary notice of a most destructive wind-rush, which occurred at Novska, in Slavonia, on May 31 last, and which he has been requested by the government to investigate on the spot. He reports that as the train left Novska station soon after 4 p.m. on that day, a sudden darkness came on; all the carriages of the train were thrown off the line with a great crash, and three of them were carried by the force of the wind to a distance of about 100 feet, the violence of the wind being aided by the bursting of two water-spouts over the railway. The tornado then traversed a primeval forest which lies to the north-east of Novska, tearing up over 150,000 large trees, and stretching them on the ground round the centre of the disturbance with the regularity of arrows around a barometric minimum of a weather chart, in a lane of about 1½ to 2 miles in diameter. Among the curious instances is one of a girl, seventeen years old, being carried unhurt for a distance of over 300 feet. Were it not for the trustworthy source whence this information is obtained we should consider it to be greatly exaggerated, but Prof. Mohoroviéié states he crossed the forest three times and carefully noted the position of the fallen trees, and he will no doubt give an official report of the occurrence later on, accompanied by meteorological data from various stations.

In vol. xiv. of *Aus dem Archiv der Deutschen Seewarte* there is a discussion by E. Herrmann on the storms of the German coast in the years 1878–1887, based upon an examination of the observations taken at forty-seven stations, and containing monthly and yearly charts showing the prevalence of the winds from the various points of the compass. The results show a great preponderance of storms in the Baltic as compared with the North Sea; in ten years 191 storms are recorded in the Baltic and 101 in the North Sea. The decrease of storms in the North Sea in summer is also much more marked than in the Baltic. The maximum of westerly storms occurs in December, and that of the easterly storms in March and April. In the summer months most storms occur in August. The change of direction of the storms from south-west to north-west occurs most frequently in February, March, October, and November; and from north-west to south-west in January, February, and October.

In a recent valuable memoir to the Berlin Academy on Thermodynamics of the Atmosphere (fourth of a series), Prof. von Bezold considers the cases of supersaturation with vapour, and of "overcooling" (regarding the latter it may be stated that clouds have been observed at a temperature below freezing, but having no ice-particles,—purely water clouds). A sudden cessation of these states, he shows, must result in rapid rise of air-pressure, which is generally of short duration, unless conditions are present which prevent its descent again. As such variations of pressure are characteristic of thunderstorms, the author goes on to investigate the *rôle* of supersaturation and overcoolings in these phenomena, and he shows how various movements and changes in form of thunderclouds, and the origin of hail and other phenomena, may be explained by them. He is of opinion that much thunderstorm rain has, high up, the form of hail or sleet, and the large drops are simply melted hail or sleet particles, these forms playing a more important part in thunderstorms than is commonly supposed.

A Reuter's telegram from Catania, dated September 2, announced that the eruption of Etna had broken out afresh, and that the chestnut woods on the mountain slopes were being devastated by the lava, which was pouring down the mountain in one dense mass, instead of flowing in two separate streams, as it did before.

The Norfolk and Norwich Naturalists' Society has issued its Transactions for 1891-92. We are glad to see that this Society, which has now entered upon its 24th year, continues to prosper, the roll of members numbering 250, and the balance-sheet being very satisfactory. The catalogue of the library, which is printed in the current number of the Transactions, occupies 43 pages. Dr. Wheeler, in his presidential address, discourses on the changes which have taken place in recent times in the distribution of some species of insects, more especially of the typical insect fauna of the old fen-land of Huntingdonshire and Cambridgeshire and of the Norfolk Broads. Dr. Plowright contributes a paper on "Neolithic Man in West Norfolk," with illustrations, by Mr. Worthington Smith, of a number of flint implements found on Massingham Heath, near Lynn, and a description of the site of an ancient British village in the same locality. This is followed by a paper on the St. Helen's Swan Pit, in Norwich, where, towards the end of August, from 80 to 100 cygnets may yearly be found gathered together for the purpose of being fatted for the table. Mr. Southwell, the writer of the paper, also gives some interesting particulars of the breeding of the Mute Swans, which abound on the Norfolk waters. Mr. Clement Reid follows with a paper "On the Natural History of Isolated Ponds," as illustrating the dispersal of the fauna and flora of a district in recent times; and Mr. O. V. Aplin contributes a paper "On the Distribution in Great Britain and Ireland of the Red-backed Shrike." This is followed by the eleventh annual report on the Herring Fishery of Yarmouth and Lowestoft, by which it appears that the enormous number of 290,650,800 of these fish were landed at those ports in 1891. There are other minor papers "On the Meteorological Features of 1891," by Mr. Preston, and shorter notes on the "Marine Fishes of Yarmouth," the "Botanical Occurrences of the Past Year," and other matters of interest.

According to a report compiled by the French Statistical Bureau, the vineyards of Europe cover 22,973,902 acres. Italy comes first with 8,575,000 acres, followed by France with 4,592,500, Spain with 4,012,500, Austria and Hungary with 1,637,500, and Germany with 300,000 acres. The annual average production of the European vineyards is put at 2,652,300,000 gallons; Italy producing (in round figures) 697,000,000 gallons, France and Spain 608,000,000 each, Austria-Hungary 208,000,000, and Germany 51,000,000 gallons. Spain exports most wine (200,000,000 gallons), but it is chiefly common wine, and it is estimated at only £12,000,000, while the value of the 56,000,000 gallons exported from France is put at nearly as much. Italy comes third with exports of 45,000,000 gallons, estimated at £2,800,000, while Austria and Hungary exported only 16,500,000 gallons worth £1,720,000.

The American journal *Electricity* notes that Prof. Elisha Gray, Chairman of the World's Congress Committee on an Electrical Congress, has returned to America from Europe. He visited England, France, Germany, Austria, Roumania, Turkey, Italy, Greece, and found everywhere that a lively interest was taken in the Columbian Exhibition. In an interview in the daily press he says, "Many eminent electricians of different countries are expected to attend the congress, including a large number from Great Britain. The work of the World's Congress auxiliary has been done so quietly that the general public is not aware of its extent and efficiency. There seems now to be no question that the World's Congress of 1893 will be very much more largely attended and will be conducted on a more imposing scale than those of any previous occasion in the world's history."

A MODEL of ocean currents is to be shown at the Chicago Exhibition. The surface of the earth is represented on "a huge scientific tank" by an area of about 30 feet square, the ocean and seas being shown by actual water. Small streams of water are ejected through pipes under the model so that the whole body of water moves exactly as the ocean currents move. The direction of the currents is shown distinctly by a white powder on the surface of the water. Near the model will be placed a large map giving details as to the force, volume, and direction of the various ocean currents.

A USEFUL catalogue of Michigan plants, prepared for the thirteenth annual report of the Secretary of the Michigan Board of Agriculture, has been issued separately. It has been drawn up by W. J. Beal and C. F. Wheeler. It is based on a "Catalogue of the Phænogamous and Vascular Cryptogamous Plants of Michigan, Indigenous, Naturalized, and Adventive," by C. F. Wheeler and E. F. Smith. The compilers hope that the publication of their list will stimulate local observers and collectors to do what they can to add to what is known about the plants of Michigan, especially in the matter of geographical distribution.

DR. R. W. SHUFELDT contributes to the Proceedings of the U.S. National Museum (vol. xv., pp. 29-31) a short but interesting paper on "A Maid of Wolpai"—a girl of about fifteen years of age, belonging to the pueblo of Wolpai in north-western Arizona. A portrait of her accompanies the paper. The writer's object is not so much to talk about this particular girl, as to describe the life of a Wolpai woman at the various stages of her career. His conclusion is that, upon the whole, it is by no means an unhappy life. "From her babyhood to maturity," he says, "it is filled in with many pleasurable chapters, and no doubt a great deal of this is due to their contented dispositions, their love of home, and their untiring industry."

IN another paper contributed to the same volume (pp. 279-282) Dr. Shufeldt discusses the evolution of house building among the Navajo Indians. From November, 1884, to the early spring of 1889 Dr. Shufeldt lived at Fort Wingate, a military station in north-western New Mexico, and during the early part of this period there was always to be found a floating population of Navajos living on the outskirts of the fort. He had thus many opportunities of studying their various arts and industries. He shows that contact with the civilization of the white man has led these Indians to improve their plans of house building, and has had "the effect of bringing about an evolution of the same."

A VERY original mode of treatment of some nervous complaints has been recently developed by Dr. Charcot, at the Salpêtrière, in Paris (*La Nature*). He was led to it by observing that patients afflicted with *paralysis agitans*, or shaking palsy, often seemed greatly relieved after long journeys by rail or carriage. The greater the train speed and oscillation, the rougher the road and the shaking, the more they liked it and were benefited. Dr. Charcot, taking up the idea, had a chair made, to which a rapid movement from side to side was imparted by electrical agency; like what one sees in processes of sifting by machinery. To a healthy person the experience is execrable; he very soon seeks relief. Not so the patient, however; he enjoys the shaking, and after a quarter of an hour of it, is another man. He stretches his limbs, loses fatigue, and enjoys a good night's sleep afterwards. There are various other nervous diseases to which the method applies. Certain physicians, indeed, have before used such things as tuning-forks and vibrating rods in treatment of neuralgia, &c. A student of Dr. Charcot, Dr. Gilles de la Tourette, has had a vibrating helmet constructed for nervous headaches. It is applied to the head by means of a number of steel strips. Above is a small electric motor making 600 turns a minute; and at each turn a uniform vibration is imparted to the metallic strips, and so to the head. The sensation is not unpleasant; it induces lassitude and sleepiness.

ON Friday last Prof. R. L. Gardner, of Virginia, addressed the Balloon Society of Great Britain on his researches relating to what he calls the speech of monkeys. He defined speech as that form of materialized thought which was restricted to such sounds as were designed to convey a definite idea from mind to mind. It was, therefore, only one mode of expressing thought; and to come within the limits of speech the sounds must be voluntary, have fixed values, and be intended to suggest to another mind a certain idea or group of ideas more or less complete. Not only did these marks characterize the sounds of monkeys as speech, but, in addition, the sounds were always addressed to certain individuals, with the evident purpose of being understood. Monkeys usually looked at the individual addressed and did not utter these sounds when alone or as a mere pastime. They understood and acted in accordance with the sounds when imitated by the phonograph or other mechanical means, and this indicated that they were guided by sounds alone, and not by signs, gestures, or a physical influence. He had also discovered that some monkeys could count three and had favourite colours, but he did not think they had names for them. He had for hours together watched monkeys convey to each other by sound the apprehension of danger and other emotions. His task, which was not easy, was to perpetuate or imitate these sounds. In some cases he was successful, but to no great extent. At last he turned to the phonograph—an instrument which was practically unknown in this country, save as a clumsy toy. But a properly manipulated phonograph could repeat sounds, previously recorded, with mathematical precision. He had the good fortune to find that the sounds so carefully preserved in one zoological garden provoked interest, and were apparently quite intelligible to monkeys in other gardens in distant countries. His observations had hitherto been conducted with monkeys in captivity, but he was now on his way to the deep forests of Western Africa, once visited by Paul du Chaillu, in order to study the language and habits of the great apes. He was carrying with him an outfit of the most complete and unique character that had ever been brought into use for such purposes. He meant to live in a cage and to provide himself with an electrical apparatus. His cage was convertible, and weighed 320lb., and he could make four cages of it and bring home a gorilla in one of them.

AT the last prize contest instituted by the City of Paris for the best electric meter the prize of 5000 francs was awarded to Prof. Elihu Thomson. Desiring that this sum should serve for the development of the theoretical knowledge of electricity, Prof. Thomson requested M. Ernst Thurnauer, General Manager for Europe of the Thomson-Houston International Electric Company, to offer a prize for the best work on a theoretical question in electricity, and to organize a committee who should propose the subjects, examine the productions, and decide the prize. The following gentlemen have consented to act as members of the Committee:—J. Carpentier, President of the Société Internationale des Electriciens; Hippolyte Fontaine; E. Hospitalier, Professor in the School of Physics and Chemistry of the City of Paris; E. Mascart, Member of the Institute; A. Potier, Member of the Institute (Examiner); B. Abdank-Abakanowicz, Consulting Engineer (Secretary of the Committee). The Committee has decided that the prize should be given for an investigation on one of the following subjects:—(1) The heat developed by successive charges and discharges of condensers under different conditions of frequency, nature of dielectric, and quantity of charge. (2) It has been shown theoretically that when the two surfaces of a condenser are connected by a conducting body, the condenser becomes the source of alternating currents as soon as the resistance of the conducting body decreases below a certain limit. The formula that permits calculating the period of this oscillation has not yet been completely verified. This period of oscillation should be investigated experimentally under conditions such that the exact measure of resistance, capacity, and coefficients of self-induction may be possible, in order to arrive at a complete and precise verification of this formula. (3) When a condenser made with an imperfect insulating material has been charged and then left to itself, the charge is gradually dissipated. The time necessary for the charge to be reduced to a given fraction of its initial value depends only on the nature of the insulating material. It is proposed to investigate whether, as certain recent theories would seem to indicate, analogous phenomena do not present themselves in metallic conductors, and whether these can be shown experimentally. (4) It is proposed to arrange and systematize our present knowledge of the graphical solutions of electrical problems, and deduce from them some general methods as in graphical statics. The theses presented may be written in any one of the following languages:—English, French, German, Italian, Spanish, or Latin. They may be in manuscript or printed. Each thesis presented must be signed by a pseudonym and accompanied by a sealed envelope bearing the same pseudonym on the outside, and with the name and address of the author inside. The papers must be sent before September 15, 1893, to B. Abdank-Abakanowicz, Consulting Engineer, the Secretary of the Committee, at 7 Rue du Louvre, Paris, who will furnish any further information required.

THE additions to the Zoological Society's Gardens during the past week include a Black-handed Spider Monkey (*Ateles geoffroyi*) from Nicaragua, presented by Mr. F. Vyner; a Macaque Monkey (*Macacus cynomolgus* ♂) from India, presented by Mr. Gerald E. Bridge; a Black-shouldered Kite (*Elanus cœruleus*) captured at sea, presented by Mr. J. Watson; a Falcated Teal (*Querquedula falcata* ♂) from China, presented by Mr. A. C. Moule; an American Black Snake (*Coluber guttata*) from North America, deposited; two Mule Deer (*Cariacus macrotis* ♀ ♀) born in the Gardens.

OUR ASTRONOMICAL COLUMN.

THE STAFF AT THE LICK OBSERVATORY.—We are sorry to notice the very considerable changes that are now taking place in the staff at the Lick Observatory. It seems only quite recently that Prof. Keeler tendered his resignation to take over the directorship of the Allegheny Observatory, but now we hear that Mr. Burnham has resigned, and that Prof. Henry Crew has done the same, the former having accepted a position of clerk in one of the courts of Chicago, and the latter having been elected to a Professorship of Physics in the North-Western University at Evanstown, Ill. With the loss of these men the observatory will be crippled for some time; for, although very good men will be found to take their places, a thorough acquaintance with the instruments can be obtained only by constant and frequent practice. Of the remainder of the staff Mr. Barnard and Mr. Schaeberle will be the only representatives of the older members. What the cause of these changes is we do not know, but there seem to be signs of a little friction somewhere, for what is the probability that three men should sever their connection with such an observatory in the space of a year—assuming, of course, normal conditions?

THE OBSERVATIONS OF KLINKERFUES REDUCED.—The second part of the *Astronomische Mittheilungen of the Royal Observatory* in Göttingen contains a complete reduction of Klinkerfues' observations which he made in the years 1858 to 1863. The work has been undertaken by the Director of the Göttingen Observatory, Prof. Wilhelm Schur, and has been printed at the expense of the König. Gesellschaft der Wissenschaften zu Göttingen. In the introduction Prof. Schur gives a complete account of the instruments used and the methods by which the observations were made. The zone included in this work is that which lies between + 15° and − 15° declination. The interest that is attached especially to these observations is caused by the fact that Klinkerfues did not wish to adopt the usual method for determining the declinations directly from the readings of the vertical circles, but he used that generally known as Gauss' method, in which a mirror and scale played an important part. The epoch to which all the places are referred is that of 1860, and a table is also added by which the yearly precession in right ascension and declination can be easily determined.

PHOTOGRAPHS OF SOLAR PHENOMENA.—To the August number of *Astronomy and Astro-Physics* are contributed some striking pictures that represent some of the latest advances made by the application of the photographic plate to the telescope. These photographs were taken by Prof. G. E. Hale, of the Kenwood Astro-Physical Observatory, with the new spectroheliograph, a description of which instrument will be found in the May number of the same Journal. The first photograph displays the spots and faculæ on the solar surface on May 21 last: a single glance at it will show us that we shall have to change very considerably our present ideas as to their extent, for instead of equalling the spots in area they exceed them so much as to place them relatively in entire insignificance. Another point that is at first noticed from the same photograph is the paucity of the faculæ at the limb with respect to the more central part of the disc, but this is, as we are told, only a fault in the process of reproduction, for in the original negatives the faculæ "are equally well shown on all parts of the solar surface." Another photograph of interest is that of the chromosphere and prominences taken on the same day; this was obtained by cutting off the light issuing from the solar disc by means of a metallic diaphragm; it resembles very strikingly a short-exposed photograph of the eclipsed sun, as the prominences on it as distinctly visible, while the presence of streamers and rifts is lacking. Since these photographs were taken, Prof. Hale has been able, by making two exposures on the same plate, to produce pictures each of which displays all the solar phenomena. For the first exposure he employed the metallic diaphragm, allowing the slits which move across it to travel with the velocity required for the prominences; for the second exposure the diaphragm was removed, and the rate of movement of the slits was this time very much increased.

A METEORITE.—In the *American Journal of Science* for August, Mr. H. L. Preston gives an account of the finding of a meteorite in Kenton County, eight miles south of Independence. In the year 1889 during the cleaning out of a spring, something very hard was struck which from the sound was thought to be metal. It was entangled among the roots of an ash tree three or four feet down in the ground, and was not removed from the spot until August 1890, when it was placed in a shed, and more recently bought for the Ward collection of meteorites. The measurements along its greatest diameters were 21 × 14 × 8 inches, and it weighed 359½ pounds. Its surface was covered with numerous but mostly shallow pittings, but was entirely free from crust. An analysis showed that it contained iron to the amount of 91·59 per cent., nickel 7·65, cobalt 0·84, carbon 0·12, with traces of copper and sulphur.

MOUNTING OF OBJECTIVES.—A novel but very useful way of mounting objectives is that adopted by Prof. Hale, who has